

REMARKS

Claims 1-36 and 49-59 are pending in this application. Claims 1, 15, 26, and 49 are amended and claims 37-48 are cancelled. Paragraph [0012] of the specification has been amended to correct a typographical error, and paragraphs [0023], [0027], and [0029] have been amended to account for the renumbering of FIG. 3 to FIG. 3A and for the addition of new drawing FIG. 3B. Entry of the amendments to the claims, the specification, and the drawings, and reconsideration of claims 1-36 and 49-59 are respectfully requested.

Amendment to the Claim 1

Claim 1 at line 6 has been amended to change “bit” to “digit” to correct a typographical error and not in response to a patentability rejection. Accordingly, this amendment should not give rise to any later estoppel with regards to a determination of a range of equivalents to the amended limitation.

Drawing Objections

The drawings have been objected to under 37 C.F.R. §1.83(a) as not showing every feature of the invention specified in the claims. Specifically, the claimed antiferromagnetic layer, two ferromagnetic layers separated by a spacer layer, and two ferromagnetic layers forming a free layer are objected to as not being shown in the drawings. Applicants submit a new FIG. 3B that shows these claimed features. Applicants have amended FIG. 3 to become FIG. 3A and submit a replacement sheet reflecting the change to the figure number. Applicants note that an antiferromagnetic layer disposed adjacent to a pinned layer is shown and labeled in FIG. 1 (reference numeral 24) and shown again, though unlabeled, in FIG. 3A. As FIG. 3B shows the claimed antiferromagnetic layer, two ferromagnetic layers separated by a spacer layer, and two ferromagnetic layers forming a free layer, Applicants request that the Examiner withdraw the objections to the drawings under 37 C.F.R. §1.83(a).

Claim Rejections

Claims 37, 39, 40, 42, and 45 have been rejected under 35 U.S.C. §102(e) as being anticipated by Durlam et al. (both US 5,940,319 and US 6,174,737). Claims 1, 2, 4, 5, 7, 10, 11, 15-17, 19, 22, 23, 26-28, 30, 33, 34, 38, 49-51, 53, 56, and 57 have been rejected under 35

U.S.C. §103(a) as being unpatentable over Durlam et al. in view of Schwarzl (US 6,510,078). Claims 3, 6, 18, 29, 41, and 52 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Durlam et al. in view of Schwarzl and in further view of Applicants' admitted prior art (APA). Claims 8, 9, 20, 21, 31, 32, 43, 44, 54, and 55 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Durlam et al. in view of Schwarzl and in further view of Nishimura (US 6,028,786). Claims 12, 14, 25, 36, 48, and 59 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Durlam et al. in view of Schwarzl and in further view of Sato et al. (US 5,986,858). Claims 13, 24, 35, 47, and 58 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Durlam et al. in view of Schwarzl and in further view of Slaughter et al. (US 6,205,052). Applicants note that claim 46 was not specifically enumerated amongst the rejected claims but is presumed to be rejected under 35 U.S.C. §103(a) as being unpatentable over Durlam et al. in view of Schwarzl as are claims 11, 23, 34, and 57 which recite essentially the same limitations.

Claim rejections 35 U.S.C. §102(e)

The rejections of claims 37, 39, 40, 42, and 45 under 35 U.S.C. §102(e) are moot in view of their cancellation herein.

Claim rejections 35 U.S.C. §103(a)

Claims 1-36, 38, 41, 43, 44, and 46-59, of which claims 1, 15, 26, and 49 are independent, have been rejected under 35 U.S.C. §103(a) as being unpatentable over Durlam et al. in view of Schwarzl, either by themselves or in combination with further references. The rejections of claims 38, 41, 43, 44, and 46-48 are moot in view of their cancellation herein.

Independent claims 1, 15, 26, and 49, as amended, recite an MRAM cell comprising a bit line including a segment and a magnetic liner layer, or sheath in claim 46, disposed entirely around the segment. Neither Durlam et al. nor Schwarzl teach or suggest a magnetic liner layer disposed entirely around a bit line segment, and Durlam et al. teaches away from such an arrangement.

Specifically, Durlam et al. summarizes that bit and digit lines “are enclosed by a high permeability layer (31, 56, 58) *excluding a surface facing magnetic memory element* (43), which shields and *focuses* a magnetic field toward magnetic memory element (43)” (Abstract, emphasis

added). Further, Durlam et al. notes that the high permeability layer “facilitates magnetic fields to concentrate on the magnetic memory element” (col. 2 lines 26-28). Although Durlam et al. does not directly address why the high permeability layer should not be disposed on the surface facing the magnetic memory element, Durlam et al. does explicitly exclude such an arrangement, and one of ordinary skill in the art would infer from Durlam et al. that such an arrangement would prevent the high permeability layer from being capable of focusing magnetic fields onto the bit and digit lines. Thus, Durlam et al. teaches away from a magnetic liner layer disposed entirely around a bit line segment as claimed.

Similarly, Schwarzl teaches “a yoke ... which partially surrounds at least one of the lines” (col. 2 lines 66-67). None of the embodiments of Schwarzl show anything more than a partial enclosure by the yoke. Thus, Schwarzl also does not teach or suggest a magnetic liner layer disposed entirely around a bit line segment.

Accordingly, independent claims 1, 15, 26, and 49 are patentable over Durlam et al. in view of Schwarzl, either by themselves or in combination with further references. Applicants therefore request that the Examiner withdraw the rejections of claims 1, 15, 26, and 49, and claims 2-14, 16-25, 27-36, and 50-59 depending therefrom, under 35 U.S.C. §103(a).

Applicants note the further patentability of certain dependent claims. Specifically, claims 10, 22, 33, and 56 recite the further limitation that the magnetic liner layer has a thickness of about 20Å to about 500Å, and claims 11, 23, 34, and 57 recite the further limitation that the magnetic liner layer has a thickness of about 30Å to about 100Å. Durlam et al. teaches Permalloy layers 56 and 58 (col. 5 lines 1-15), but does not teach or suggest a thickness for these layers. The Examiner contends that Durlam et al. (col. 4 line 32) teaches a thickness range for these layers of 20Å - 200Å (e.g., page 3 last sentence). However, Applicants note that this thickness range is not taught for the Permalloy layers 56 and 58, but actually for the layers 40-42 in the magnetic memory element (col. 4 lines 16-32).

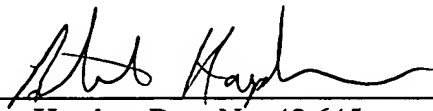
CONCLUSION

All pending claims are now allowable and Applicants therefore respectfully request a Notice of Allowance. Should the Examiner have questions, the Applicants' undersigned agent may be reached at the number provided.

Respectfully submitted,

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